Example #3: A 1000 kg car, travelling at 22 m/s strikes a concrete bridge support and comes to a complete halt in 0.50 seconds.

a) **What average force acts on the car?**
b) **If the support was cushioned so that it took 3.0 sec. to stop, what is the force now?**
c) **Explain the significance of these two very different values.**

a) $\Delta p = m(v_f - v_i)$

$= 1000(0 - 22)$

$= -22000 \text{ N} \cdot \text{s}$

$\Delta p = Ft \quad -22000 = F(.50)$

$\boxed{F = -4.4 \times 10^4 \text{ N}}$

b) $\Delta p = -22000 \text{ N} \cdot \text{s} \rightarrow$ unchanged, because Δv is the same.

$\Delta p = Ft \quad -22000 = F(3.0)$

$\boxed{F = -7.3 \times 10^3 \text{ N}}$

c) Since Δp is constant,

$F \propto \frac{1}{t}$, so as t increases, F decreases.